

Shehbaz Tariq

Postdoctoral Researcher at SnT¹
University of Luxembourg, Luxembourg

Interdisciplinary Centre for
Security, Reliability and Trust
29, boulevard JF Kennedy
L-1855 LUXEMBOURG

Phone: +352 691 573600
Email: shehbaz.tariq@uni.lu



Education

- **Kyung Hee University, Yongin-si, Korea** Mar. 2021 – Aug. 2025
Ph.D. in Electronic and Information Convergence Engineering
Specialization in Quantum Computing and Machine Learning (MS leading to Ph.D)
CGPA: 4.28 / 4.50
- **University of Engineering and Technology, Peshawar, Pakistan,** Aug. 2016 – Sep. 2020
Bachelor of Engineering in Electrical Engineering
CGPA: 3.87 / 4.00
Final Year Project: AIOT-based monitoring app for smart cities

Research Interests

General research interest is quantum information processing for communication systems, emphasizing integrating quantum technologies with 6G and future networks, quantum network design and applications, and utilizing large AI models to develop integrated hybrid algorithms for next-generation networks.

Teaching Interests

Quantum Computing, Quantum Communications, Large AI applications for Quantum Information Processing, Machine Learning Programming, and Linear Algebra.

Experience

Work Experience

- **SnT, University of Luxembourg, Kirchberg, Luxembourg** Apr. 2025 – Present
Postdoctoral Researcher at Signal Processing and Communications (SIGCOM) Research Group
Conduct research on Quantum MIMO systems and Quantum Reservoir Computing.
Develop optimization and quantum machine learning techniques for wireless communication systems.
Collaborate with academic and industrial partners on large-scale European research projects.
- **Kyung Hee University, Yongin-si, Korea** Mar. 2021 – Mar. 2024
CQILAB Fellow & Research Assistant
Department of Electronics and Information Convergence Engineering
Mentored undergraduate and graduate students in their research in quantum information sciences.
Led group seminars on Quantum Machine Learning and AI.
Managed and coordinated different teams working on large-scale R&D projects including national research foundation (NRF)-funded projects.
- **Queen's University Belfast, Northern Ireland, UK** Oct. 2023
Visiting Scholar
School of Electronics, Electrical Engineering and Computer Science
Organized seminars on Large AI applications for quantum computing, 6G and beyond.
Managed and coordinated different teams working on quantum optimization for 6G applications.

¹Interdisciplinary Centre for Security, Reliability and Trust (SnT)

- **University of Engineering and Technology, Peshawar, Pakistan**
Research Intern
 National Center of Artificial Intelligence (NCAI)
 Learned the core concepts of Machine Learning and AI.
 Assisted the Smart Flood and Safe City Teams.

Mar. 2019 – Aug. 2019

Publications & Presentations

Under Review/Preprints

- [1] L. Oleynik, S. Tariq, S. Chatzinotas, "Optimal GHZ-State Distribution in LOSR Quantum Networks via Local Decoding from Information Sets," *arXiv preprint arXiv:2606.21500*, 2026.
- [2] J. ur Rehman, S. Tariq, S. Chatzinotas, "Quantum Key Distribution Without Shared Reference Frame Under Unital Noise," *arXiv preprint arXiv:2606.23239*, 2026.
- [3] J. Kaldari, S. Tariq, S. Al-Kuwari, S. Y. Chen, S. Chatzinotas, H. Shin, "Quantum Reinforcement Learning: Recent Advances and Future Directions," *arXiv preprint arXiv:2510.14595*, 2025.
- [4] S. Tariq, M. Talha, S. Chatzinotas, H. Shin, "Towards Quantum Enhanced Adversarial Robustness with Rydberg Reservoir Learning," *arXiv preprint arXiv:2510.13473*, 2025.
- [5] S. Tariq, J. ur Rehman, S. Chatzinotas, "Quantum MIMO Diversity over Discrete-Variable Crosstalk Channels," *arXiv preprint arXiv:2508.07344*, 2025.
- [6] C. Zhang, Y. Qiao, S. Tariq, S. Zheng, C. Zhang, C. Li, H. Shin, C. S. Hong, "Understanding Segment Anything Model: SAM is Biased Towards Texture Rather than Shape," *arXiv preprint arXiv:2311.11465*, 2023.
- [7] S. Tariq, B. E. Arfeto, C. Zhang, H. Shin, "Segment Anything Meets Semantic Communication," *arXiv preprint arXiv:2306.02094*, 2023.
- [8] M. Awais, Q. Abbas, S. Tariq, S. H. Warraich, "Blockchain Based Secure Energy Marketplace Scheme to Motivate Peer to Peer Microgrids," *arXiv preprint arXiv:2206.07248*, 2022.

Journal Papers

- [1] S. Tariq, S. Chatzinotas, "Design and Optimization of Adaptive Diversity Schemes in Quantum MIMO Channels," *npj Quantum Information*, 2026.
- [2] N. Lae, S. Tariq, S. N. Paing, J. W. Setiawan, S. Kim, T. Q. Duong, H. Shin, "Counterfactual Quantum Secret Sharing," *IEEE Transactions on Communications*, 73(10), 9196-9206, 2025.
- [3] B. E. Arfeto, S. Tariq, U. Khalid, T. Q. Duong, H. Shin, "GenSC-6G: A Prototype Testbed for Integrated Generative AI, Quantum, and Semantic Communication," *IEEE Communications Magazine*, 63(10), 28-35, 2025.
- [4] S. Tariq, B. E. Arfeto, U. Khalid, S. Kim, T. Q. Duong, H. Shin, "Deep Quantum-Transformer Networks for Multimodal Beam Prediction in ISAC Systems," *IEEE Internet of Things Journal*, 11(18), 29387-29401, 2024.
- [5] S. Tariq, A. Farooq, J. ur Rehman, T. Q. Duong, H. Shin, "Efficient Quantum State Estimation with Low-Rank Matrix Completion," *EPJ Quantum Technology*, 11(1), 50, 2024.
- [6] S. Tariq, U. Khalid, B. E. Arfeto, T. Q. Duong, H. Shin, "Integrating Sustainable Big AI: Quantum Anonymous Semantic Broadcast," *IEEE Wireless Communications*, 31(3), 86-99, 2024.
- [7] S. N. Paing, J. W. Setiawan, S. Tariq, M. T. Rahim, K. Lee, H. Shin, "Counterfactual Anonymous Quantum Teleportation in the Presence of Adversarial Attacks and Channel Noise," *Sensors*, 22(19), 7587, 2022.

Refereed Conference Proceedings

- [1] S. Tariq, J. ur Rehman, S. Chatzinotas, "Quantum MIMO Diversity Framework Using Approximate Cloning and Probabilistic Purification," in *Proceedings - 2026 International Conference on Quantum Communications, Networking, and Computing, QCNC 2026*, Kobe, Japan, pp. 29-36, 2026.
- [2] B. E. Arfeto, S. Tariq, H. Shin, "Edge Diffusion Model for Enhanced Resolution in Semantic Communication," in *Proc. Korea Information and Communications Society (KICS) Fall Conference*, Gyeongju, Korea, pp. 230-232, 2024.
- [3] P. M. Min, B. E. Arfeto, S. Tariq, H. Shin, "Quantum-Augmented LSTM Networks for Stock Price Forecasting," in *Proc. Korea Information and Communications Society (KICS) Fall Conference*, Gyeongju, Korea, pp. 221-222, 2024.
- [4] M. Talha, S. Tariq, H. Shin, "Recent Advances in Quantum Reservoir Computing," in *Proc. Korea Information and Communications Society (KICS) Fall Conference*, Gyeongju, Korea, 2024.
- [5] S. Tariq, J. ur Rehman, H. Shin, "Quantum Reinforcement Learning for Digital Twin Placement in 6G Networks," in *Proc. Joint Conference on Communications and Information (JCCI)*, Busan, Korea, 2024.
- [6] S. Tariq, B. E. Arfeto, H. Jung, H. Shin, "Beam Prediction in mmWave V2I Communications with Quantum Transformer Networks," in *ICTC 2024 - 15th International Conference on ICT Convergence: AI-Empowered Digital Innovation*, Jeju Island, Korea, pp. 488-493, 2024.
- [7] S. Tariq, M. S. Ulum, A. W. Shaffar, W. Park, S. Kim, H. Shin, "Multi-Agent Quantum Reinforcement Learning for Digital Twin Placement in 6G Multi-Tier Systems," in *Industrial Networks and Intelligent Systems - 10th EAI International Conference, INISCOM 2024, Proceedings*, Da Nang, Vietnam, pp. 73-92, 2024.
- [8] A. U. Haque, S. Tariq, H. Jung, H. Shin, "Quantum Approximate Optimization for Optimal EV Charging Schedules," in *Proc. Joint Conference on Communications and Information (JCCI)*, Yeosu, Korea, 2023.
- [9] U. I. Paracha, S. Tariq, M. Choi, H. Shin, "Bit-Flip Error Mitigation Using Deep Learning," in *Proc. Korea Information and Communications Society (KICS) Winter Conference*, Pyeongchang, Korea, pp. 22-23, 2023.
- [10] A. U. Haque, S. Tariq, H. Jung, H. Shin, "Prototyping a Quantum Clustering Algorithm for NISQ Computing," in *Proc. Korea Information and Communications Society (KICS) Winter Conference*, Pyeongchang, Korea, pp. 20-21, 2023.
- [11] S. Tariq, K. Lee, H. Shin, "Deep Learning Assisted Quantum State Tomography," in *Proc. Korea Information and Communications Society (KICS) Fall Conference*, Gyeongju, Korea, 2022.
- [12] A. W. Shaffar, S. Tariq, H. Shin, "Quantum Convolutional Neural Networks for Binary Classification," in *Proc. Korea Information and Communications Society (KICS) Fall Conference*, Gyeongju, Korea, pp. 211-212, 2022.
- [13] A. W. Shaffar, M. A. Ullah, S. Tariq, H. Shin, "Experimental Benchmarking Between IBM Quantum Computing Systems," in *Proc. Korea Information and Communications Society (KICS) Summer Conference*, Jeju, Korea, pp. 924-925, 2022.
- [14] S. Tariq, A. Farooq, H. Shin, "Robust Quantum State Tomography with Linear Regression," in *Proc. Korea Information and Communications Society (KICS) Summer Conference*, Jeju, Korea, pp. 918-919, 2022.
- [15] S. Tariq, A. Farooq, J. ur Rehman, H. Shin, "Error Analysis of Gate and Pulse Model Quantum Circuits," in *Proc. Korea Information and Communications Society (KICS) Winter Conference*, Pyeongchang, Korea, pp. 656-657, 2022.

Certifications

- Qiskit Global Summer School (2024) — IBM [↗](#)
- Variational Algorithm Design (2024) — IBM [↗](#)
- AI Programming with Python (2023) — Udacity [↗](#)
- Generative AI for Everyone (2023) — DeepLearning.AI [↗](#)
- XCS229 - Machine Learning (2022) — Stanford Online [↗](#)

Honors and Awards

- Two-time Recipient of Khreative U+ Creative Innovation KHU-Fellowship (2022 & 2023)
- Doctoral Research Scholarship, BrainKorea21 Plus, 2021 – 2025
- Graduate Student Scholarship, Kyung Hee University, 2021 – 2025
- National Grassroots ICT Research Initiative FYP Grant, 2020
- STOORI DA PAKHTUNKHWA Provisional Government Scholarship, 2016
- STOORI DA MARDAN District Government Scholarship, 2016

Professional References

1. Prof. Symeon Chatzinotas
Designation: Full Professor and SIGCOM Head
Affiliation: Interdisciplinary Centre for Security, Reliability and Trust (SnT),
University of Luxembourg, Luxembourg
Relation: Supervisor
email: symeon.chatzinotas@uni.lu
Phone: (+352) 46 66 44 5767
2. Prof. Hyundong Shin
Designation: Full Professor and Dean
Affiliation: Department of Electronics and Information Convergence Engineering,
Kyung Hee University, South Korea
Relation: Ph.D. Advisor
email: hshin@khu.ac.kr
Phone: +82-31-201-3812
3. Prof. Trung Q. Duong
Designation: Full Professor
Affiliation: Faculty of Engineering and Applied Science,
Memorial University of Newfoundland, Canada
Relation: Research Collaborator
email: tduong@mun.ca
Phone: (+1) 709 864 2391
4. Dr. Junaid ur Rehman
Designation: Assistant Professor
Affiliation: Department of Electrical Engineering,
King Fahd University of Petroleum and Minerals,
Dhahran, Saudi Arabia
Relation: Research Collaborator
email: junaid.urrehman@kfupm.edu.sa
Phone: (+966) 13 860 5360